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Short Cruise Report
MERIAN MSM 13/4 “HOMER”
Limassol - Limassol
21.11.2009 – 14.12.2009
Chief Scientist: Frank Wenzhöfer
Captain: Karl Friedhelm von Staa

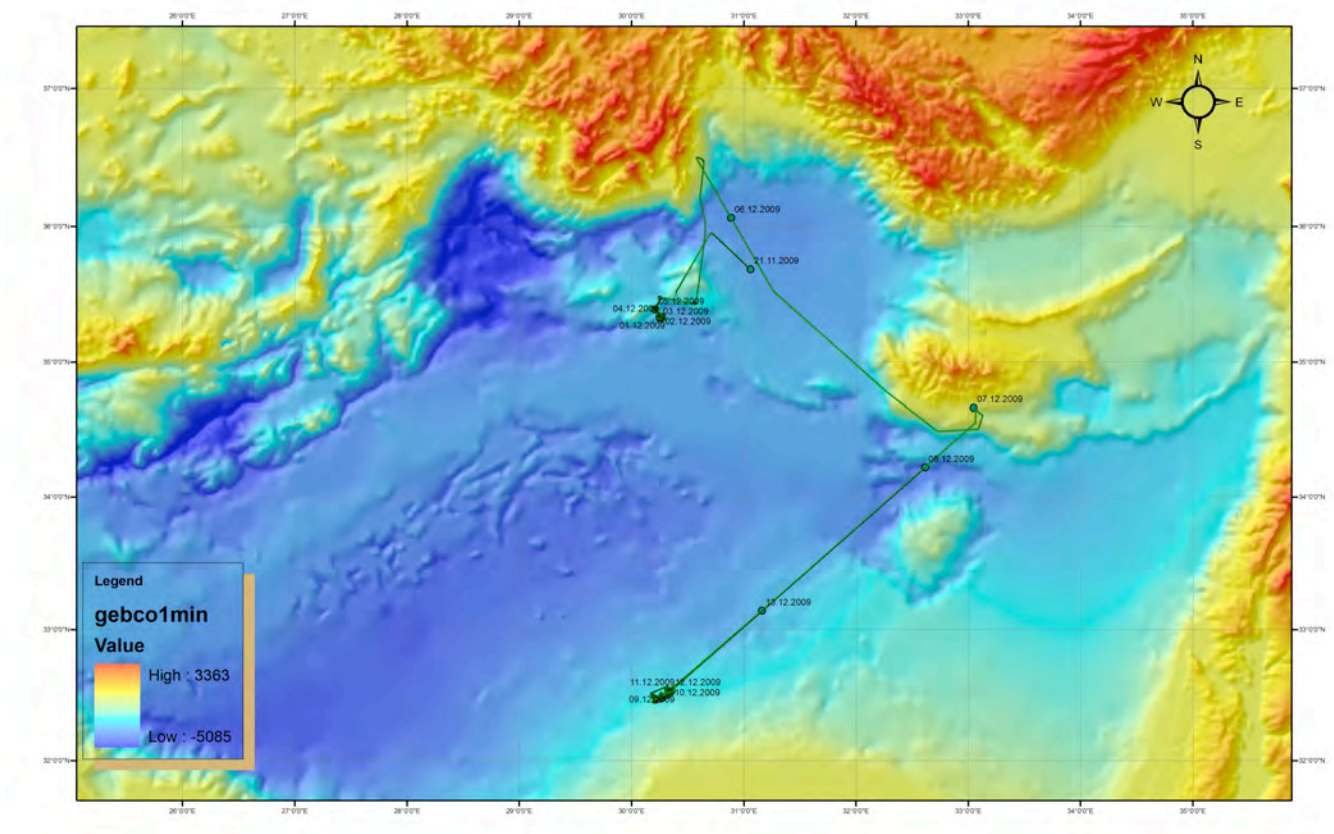

Fig. 1 Trackplot of MSM13-4

Objectives

The cruise leg MSM13/4 investigated chemosynthetic ecosystems of the deep Eastern Mediterranean. At fluid escape structures in water depths of 1000 - 2000 m energy rich chemical substances such as sulfur and hydrocarbon compounds are available to fuel rich and abundant microbial life and diverse chemosynthetic ecosystems. The main objectives of leg MSM13/4 were 1) to obtain a quantitative insight in element cycling and export at different types of fluid seeps in the Eastern Mediterranean and 2) to understand the relation and interaction between fluid seepage and seep biodiversity and community distribution. Another special type of chemosynthetic ecosystem investigated was large wood falls. Experiments have been deployed 3 and 2 years ago but also during the previous leg MSM13/3 and have been re-sampled and recovered to get a better understanding of temporal succession of wood degrading communities. The main technologies to study these chemosynthetic ecosystems were the ROV QUEST4000 (MARUM) equipped with a variety of payloads for in situ measurements (MPI Bremen) and sampling and the AUV B-SEAL (MARUM) for detailed near-field mapping of selected habitats with Multibeam and side scan sonar. Additionally an online heat flux corer (Ifm-Geomar) was used for in situ measurements of sediment temperature and thermal conductivity. The targeted videographic and biogeochemical as well as ecological investigations were used in combination to quantify physical, biogeochemical and ecological processes in chemosynthetic ecosystems, and to study the link between the deep-water geosphere and biosphere in the Eastern Mediterranean. This will help to reveal the geological processes, which cause different ecosystem structures and habitat distributions, and to quantify the amount and fate of climate relevant gases that escape with the fluids or are utilized and consumed by the chemosynthetic biota. Three working areas had been selected: The “East Delta” in the eastern Nile fan province, around 32°22’N, 31°42’E with comparably young mud volcanoes with fluid seepage; the “Central Area” around 32°38’N, 29°55’E, with a high density of pockmarks harboring carbonate chimneys and pavements as well as patchy colonies of chemosynthetic organisms, and the Anaximander area at 35°10’ N, 29°10’ E with its dense accumulations of tube worms. Expedition MSM 13/4 contributed to the EC’s 7th FP HERMIONE, the GDRE DIWOOD and ESF EUROCORES project CHEMECO, as well as to the goals of the research center MARUM (Geosphere-Biosphere Research).

Narrative

Cruise leg MSM 13/4 started in the morning of November 21st. Our first task was to pick up the Turkish observer, which happened during a rendezvous with a Turkish coast guard boat. Afterwards we continued our journey to the first working area, the Anaximander region, where we started our work on the Amsterdam mud volcano with a first Lift and ROV deployment in the morning of November 22nd. During the first week (Nov. 22. – 29.) the AUV B-Seal (Marum, Bremen) was launched several times and could perform three missions covering the central area of the Amsterdam mud volcano. These AUV dives were the deepest and longest mission so far. The processed high-resolution bathymetry maps will be used to relate our sediment measurements, samples and ROV video observations to the mud volcano structure. During several ROV dives in the northern area of the mud volcano different benthic habitats were sampled. Surprisingly, the seafloor was covered with rather big stones, which sometimes created some difficulties to sample the sites and to perform in situ measurements, respectively. The reduced sediments revealed however,

a variety of benthic life. In-between the AUV and ROV dives we searched for gas flares using the shipboard Parasound system and several flares could be located at the rim of the mud volcano. During subsequent ROV-dives these gas emissions were visually documented and the escaping gas was sampled. Head flow transects crossing the mud volcano from east to west and north to south showed that temperature anomalies were distributed over a large area.

The second week (Nov 30. – Dec. 06.) started with AUV-dive 27, on November 30th, which was the longest mission possible. After 9 hours and 39 km of survey the AUV returned to surface with almost empty batteries. However, during its dive the AUV mapped the northern, western and southern rim of the mud volcano and thus covered almost the entire geostructure. The entire bathymetry map revealed that the Amsterdam mud volcano is a complex structure with a rough center, a smoother outer area towards west, surrounded by a rough rim. The high-resolution data enabled us also to identify single structures at the seafloor. December 2nd and 3rd were characterized by bad weather preventing any AUV or ROV dives. Thus these days were used to perform additional heat flow measurements to better define the active area of the mud volcano. Further Parasound transects were used to map the gas flares over time since the previous data showed that the seeps were not constantly emitting gas but revealed some periods of quietness. In total 34 flares could be detected clustering in three sites. Besides the strong flares seen, which often reach up to 750m into the water column, several weaker flares, extending between 100 and 500 m into the water column, were detected. On Dec 5th the weather situation improved but technical problems with the ROV prevented any further dive at the Amsterdam mud volcano. The remaining time before we had to leave the working area the next day was used with Parasound mapping of the Thessaloniki and Kula mud volcanoes. On our transit to the working areas in the Nil fan province the Turkish observer disembarked in the evening of December 6th and we used the chance for a stopover in Limassol to pick up some spare parts for the ROV. Due to the stormy weather at the working sites in front of the Nile deep sea fan and the repair work on the ROV Quest we decided to extent our anchorage a bit to take advantage of the cam conditions. After we reached our working area at the Pockmark site in the morning of December 9th our next ROV dive 262 was dedicated to recover several colonization experiments and sediment samples from chemosynthetic ecosystems, which were deployed during the previous leg MSM 13/3. Unfortunately we had to abort the dive due to a failure in the ROV electronic and some malfunctions of the manipulator in the middle of our working program. Some of the required sediment samples were then sampled by TV-MUC. The navigation of the ship even with an instrument hanging at almost 2000m water depth was that precise that we were able to hit even small mat patches of a few meters next to our instruments. On December 10th the AUV-team started another successful mission. The AUV B-Seal mapped ca. 22km of the Pockmark area; main focus was to map the areal distribution of carbonate crusts. In combination with our gas flare mapping this might lead to a correlation of crusts and gas emissions. In the evening ROV Quest was ready again for its next dive and we continued our sampling program from the previous dive. December 11th was then entirely used to sample different chemosynthetic ecosystems with the TV-MUC. The precise positioning of ship allowed retrieving samples from four habitats. Since the positioning was that excellent we decided even to recover our benthic chamber module with the TV-MUC. Adding some hooks below the MUC frame allowed us to fish the instrument from 1600m water depths. Seas were too rough for AUV and ROV deployments during the next days, so we continued with TV-MUC and Multibeam/Parasound transects. Our work program ended with the recovery of the instrument Lift mid day of December 13th after which we started our transit to Cyprus. In the morning of December 14th we reached Limassol harbor were our expedition HOMER ended.

Acknowledgements

We thank Captain and crew of the MERIAN expedition MSM13/4 for their excellent support of our work at sea. Also, we thank the ROV QUEST and AUV B-Seal team for the excellent dives and the tireless efforts in repairing the ROV. Many thanks go to the German Embassy in Nicosia and to the MERIAN coordination office (Leitstelle) for their help with the permissions and the harbour logistics. The ship time was provided by the Deutsche Forschungsgemeinschaft. Financial support for the different projects carried out during the cruise was provided though the EU- and ESF Projects HERMIONE and EURODEEP, as well as by the research institutes involved. We gratefully acknowledge this support.

List of participants

Name	Function	Institute
1. Wenzhöfer, Frank	Fahrtleiter / Chief Scientist	MPI
2. Boetius, Antje	Microbiology	AWI
3. Pop Ristova, Petra	In situ Instruments	MPI
4. Felden, Janine	In situ Instruments	MPI
5. Beier, Viola	Biogeochemistry/ Microbiology	MPI
6. Stiens, Rafael	Biogeochemistry	MPI
7. Römer, Miriam	Gas flux	MARUM
8. Rodrigues, Clara	Wood experiments	UPMC
9. Vanreusel, Ann	Biology/Fauna	U Gent
10. Wetzel, Gero	Heat flow	IFM GEOMAR
11. Meinecke, Gerrit	AUV	MARUM
12. Renken, Jens	AUV	MARUM
13. Kopiske, Eberhard	AUV	MARUM
14. Wintersteller, Paul	GIS, Geophysics	MARUM
15. Nordhausen, Axel	Shuttle	MPI
16. Seiter, Christian	ROV	MARUM
17. Meyer, Jörn Patrick	ROV	MPI
18. Buhmann, Sitta	ROV	MARUM
19. Reuter, Michael	ROV	MARUM
20. Reuter, Christian	ROV	MARUM
21. Dehning, Klaus	ROV	MARUM
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Stationsliste

Station	Date	Time	Position Lat	Position Lon	Depth [m]	Gear
MSM13/982-1	22.11.09	2:44	35° 20.00' N	30° 16.00' E	2025,8	SVP-SONDE
MSM13/983-1	22.11.09	7:07	35° 20.0550' N	30° 16.1640' E	2025,3	Elevator
MSM13/984-1	22.11.09	13:22	35° 20.01' N	30° 16.20' E	2024,1	ROV
MSM13/985-1	22.11.09	13:54	35° 20.01' N	30° 16.20' E	0	AUV
MSM13/986-1	23.11.09	3:05	35° 19.9100' N	30° 16.1189' E	2015	Heat Flow
MSM13/986-2	23.11.09	3:41	35° 19.9150' N	30° 16.1581' E	2013	Heat Flow
MSM13/986-3	23.11.09	4:07	35° 19.9181' N	30° 16.2040' E	2017	Heat Flow
MSM13/986-4	23.11.09	4:51	35° 19.9191' N	30° 16.2300' E	2022	Heat Flow
MSM13/986-5	23.11.09	5:14	35° 19.9209' N	30° 16.2581' E	2019	Heat Flow
MSM13/986-6	23.11.09	5:39	35° 19.9250' N	30° 16.2901' E	2017	Heat Flow
MSM13/986-7	23.11.09	5:58	35° 19.9289' N	30° 16.3241' E	2021	Heat Flow
MSM13/986-8	23.11.09	6:25	35° 19.9300' N	30° 16.3561' E	2013	Heat Flow
MSM13/986-9	23.11.09	6:47	35° 19.9340' N	30° 16.3929' E	2013	Heat Flow
MSM13/986-10	23.11.09	7:14	35° 19.9369' N	30° 16.4300' E	2011	Heat Flow
MSM13/987-1	23.11.09	9:37	35° 19.94' N	30° 16.11' E	0	AUV
MSM13/988-1	23.11.09	18:01	35° 20.0606' N	30° 16.1509' E	2025,8	Elevator
MSM13/989-1	23.11.09	19:37	35° 20.06' N	30° 16.14' E	2024,6	ROV
MSM13/990-1	24.11.09	12:16	35° 19.9400' N	30° 16.4660' E	2026,4	Heat Flow
MSM13/990-2	24.11.09	12:52	35° 19.95' N	30° 16.53' E	2031,2	Heat Flow
MSM13/990-3	24.11.09	13:16	35° 19.9469' N	30° 16.5640' E	2039,9	Heat Flow
MSM13/990-4	24.11.09	13:44	35° 19.9500' N	30° 16.6011' E	2043,9	Heat Flow
MSM13/990-5	24.11.09	14:19	35° 19.9531' N	30° 16.6570' E	2032,9	Heat Flow
MSM13/990-6	24.11.09	14:45	35° 19.9611' N	30° 16.7279' E	2018,9	Heat Flow
MSM13/990-7	24.11.09	15:20	35° 19.9660' N	30° 16.8101' E	2017,4	Heat Flow
MSM13/990-8	24.11.09	16:03	35° 19.9760' N	30° 16.9240' E	2041,1	Heat Flow
MSM13/990-9	24.11.09	17:29	35° 19.9100' N	30° 16.1179' E	2022,6	Heat Flow
MSM13/990-10	24.11.09	18:00	35° 19.9080' N	30° 16.0769' E	2026,4	Heat Flow
MSM13/990-11	24.11.09	18:23	35° 19.9049' N	30° 16.0339' E	2026,2	Heat Flow
MSM13/990-12	24.11.09	18:49	35° 19.9021' N	30° 15.9911' E	2026,8	Heat Flow
MSM13/990-13	24.11.09	19:15	35° 19.8970' N	30° 15.9339' E	2028,1	Heat Flow
MSM13/990-14	24.11.09	19:42	35° 19.8920' N	30° 15.8770' E	2026,2	Heat Flow
MSM13/991-1	24.11.09	21:32	35° 19.06' N	30° 14.94' E	2082,9	Parasound
MSM13/991-2	25.11.09	2:08	35° 20.28' N	30° 16.11' E	2034,3	Parasound
MSM13/991-3	25.11.09	4:03	35° 19.91' N	30° 16.10' E		Parasound
MSM13/992-1	25.11.09	5:54	35° 20.12' N	30° 16.22' E		AUV
MSM13/993-1	25.11.09	14:12	35° 20.0550' N	30° 16.1650' E	2023,8	Elevator
MSM13/994-1	25.11.09	16:12	35° 20.06' N	30° 16.17' E	2024,6	ROV
MSM13/995-1	26.11.09	10:55	35° 19.9119' N	30° 16.0790' E	2024,6	Gravity corer
MSM13/996-1	26.11.09	12:28	35° 19.9119' N	30° 16.1210' E	2023,3	Gravity corer
MSM13/997-1	26.11.09	14:23	35° 20.21' N	30° 16.27' E		AUV
MSM13/998-1	27.11.09	2:34	35° 19.88' N	30° 17.12' E	2062,6	TV Multicorer
MSM13/999-1	27.11.09	4:25	35° 20.39' N	30° 16.22' E	2032,7	AUV
MSM13/1000-1	27.11.09	7:41	35° 19.9150' N	30° 16.0769' E	2024	Gravity corer
MSM13/1001-1	27.11.09	8:55	35° 19.9150' N	30° 16.0749' E	2023,8	Gravity corer
MSM13/1002-1	27.11.09	13:20	35° 20.11' N	30° 16.22' E	2025,8	ROV
MSM13/1003-1	28.11.09	4:15	35° 19.96' N	30° 15.94' E		AUV
MSM13/1004-1	28.11.09	12:46	35° 19.9570' N	30° 16.0240' E		Elevator
MSM13/1005-1	28.11.09	16:21	35° 19.96' N	30° 15.99' E		ROV

MSM13/1006-1	28.11.09	19:58	35° 20.1149' N	30° 16.1081' E	2030,8	Heat Flow
MSM13/1006-2	28.11.09	20:31	35° 20.0781' N	30° 16.1089' E	2025,8	Heat Flow
MSM13/1006-3	28.11.09	21:20	35° 20.0840' N	30° 16.2970' E	2024,8	Heat Flow
MSM13/1006-4	28.11.09	22:07	35° 20.0240' N	30° 16.1710' E	2024,6	Heat Flow
MSM13/1006-5	28.11.09	22:39	35° 20.0281' N	30° 16.1130' E	2025,2	Heat Flow
MSM13/1006-6	28.11.09	23:03	35° 19.9930' N	30° 16.1140' E	2025	Heat Flow
MSM13/1006-7	28.11.09	23:31	35° 19.9601' N	30° 16.1169' E	2023,3	Heat Flow
MSM13/1006-8	28.11.09	23:55	35° 19.9469' N	30° 16.1161' E	2024,3	Heat Flow
MSM13/1006-9	29.11.09	0:16	35° 19.9340' N	30° 16.1161' E	2024,6	Heat Flow
MSM13/1006-10	29.11.09	0:36	35° 19.9219' N	30° 16.1189' E	2036,7	Heat Flow
MSM13/1006-11	29.11.09	0:58	35° 19.9129' N	30° 16.1220' E	2027,7	Heat Flow
MSM13/1006-12	29.11.09	1:30	35° 19.89' N	30° 16.12' E	2024,6	Heat Flow
MSM13/1006-13	29.11.09	1:38	35° 19.8730' N	30° 16.1200' E	2025	Heat Flow
MSM13/1006-14	29.11.09	2:03	35° 19.8441' N	30° 16.1220' E	2024,5	Heat Flow
MSM13/1006-15	29.11.09	2:25	35° 19.8230' N	30° 16.1200' E	2025,1	Heat Flow
MSM13/1006-16	29.11.09	2:53	35° 19.7890' N	30° 16.1220' E	2025,3	Heat Flow
MSM13/1004-1	29.11.09	7:34	35° 19.98' N	30° 16.03' E	2025,7	Elevator
MSM13/1007-1	29.11.09	10:10	35° 19.96' N	30° 16.81' E	2015,6	TV Multicorer
MSM13/1008-1	29.11.09	13:57	35° 19.96' N	30° 16.82' E	2018,2	TV Multicorer
MSM13/1009-1	29.11.09	16:07	35° 20.0281' N	30° 16.1821' E	2024,2	Gravity corer
MSM13/1010-1	29.11.09	17:42	35° 20.0289' N	30° 16.1810' E	2024,6	Gravity corer
MSM13/1011-1	29.11.09	18:56	35° 20.0289' N	30° 16.1810' E	2025,3	Gravity corer
MSM13/1012-1	29.11.09	20:29	35° 19.9119' N	30° 16.1241' E	2024,8	Gravity corer
MSM13/1013-1	29.11.09	21:30	35° 20.14' N	30° 17.66' E	2086,7	Multibeam+Parasound
MSM13/1013-2	30.11.09	1:45	35° 19.21' N	30° 14.75' E	2059,4	Parasound
MSM13/1014-1	30.11.09	5:52	35° 19.96' N	30° 16.06' E		AUV
MSM13/1015-1	30.11.09	15:28	35° 19.88' N	30° 15.90' E		Parasound
MSM13/1016-1	30.11.09	19:57	35° 19.9570' N	30° 16.0240' E		Elevator
MSM13/1017-1	30.11.09	20:39	35° 19.95' N	30° 16.03' E		ROV
MSM13/1018-1	01.12.09	1:20	35° 20.26' N	30° 17.25' E	2084,1	TV Multicorer
MSM13/1019-1	01.12.09	3:36	35° 20.24' N	30° 17.29' E	2089,1	TV Multicorer
MSM13/1020-1	01.12.09	5:29	35° 20.0250' N	30° 16.1700' E	2023,5	Gravity corer
MSM13/1021-1	01.12.09	6:37	35° 20.0240' N	30° 16.1759' E	2024,1	Gravity corer
MSM13/1022-1	01.12.09	9:40	35° 19.95' N	30° 16.08' E	2024,1	ROV
MSM13/1023-1	02.12.09	0:35	35° 20.13' N	30° 15.67' E		Parasound
MSM13/1024-1	02.12.09	7:17	35° 20.0851' N	30° 16.1130' E	2026,2	Heat Flow
MSM13/1024-2	02.12.09	7:45	35° 20.0761' N	30° 16.1331' E	2025,8	Heat Flow
MSM13/1024-3	02.12.09	8:21	35° 20.0260' N	30° 16.1839' E	2023,8	Heat Flow
MSM13/1024-4	02.12.09	9:12	35° 20.0830' N	30° 16.4200' E	2028,3	Heat Flow
MSM13/1024-5	02.12.09	9:55	35° 20.0119' N	30° 16.4171' E	2028,8	Heat Flow
MSM13/1024-6	02.12.09	10:27	35° 19.9281' N	30° 16.4161' E	2022,9	Heat Flow
MSM13/1024-7	02.12.09	11:01	35° 19.8611' N	30° 16.4171' E	2028,1	Heat Flow
MSM13/1024-8	02.12.09	12:39	35° 20.2281' N	30° 17.2670' E	2090,1	Heat Flow
MSM13/1025-1	02.12.09	14:57	35° 19.9400' N	30° 16.0901' E	2024,5	Heat Flow
MSM13/1025-2	02.12.09	15:20	35° 19.9310' N	30° 16.1009' E	2024,9	Heat Flow
MSM13/1025-3	02.12.09	15:40	35° 19.9160' N	30° 16.1110' E	2025,5	Heat Flow
MSM13/1025-4	02.12.09	16:05	35° 19.8970' N	30° 16.1311' E	2022,5	Heat Flow

MSM13/1025-5	02.12.09	16:37	35° 19.8861' N	30° 16.1429' E	2025,3	Heat Flow
MSM13/1025-6	02.12.09	17:01	35° 19.8730' N	30° 16.1570' E	2024	Heat Flow
MSM13/1025-7	02.12.09	17:19	35° 19.8601' N	30° 16.1669' E	2022,5	Heat Flow
MSM13/1026-1	02.12.09	19:49	35° 20.2281' N	30° 17.2640' E	2082,9	Gravity corer
MSM13/1027-1	02.12.09	22:02	35° 20.0810' N	30° 16.1099' E	2026,5	Gravity corer
MSM13/1028-1	02.12.09	23:47	35° 22.95' N	30° 13.29' E	1909,3	Parasound
MSM13/1029-1	03.12.09	3:14	35° 22.66' N	30° 13.91' E	2035,7	Multibeam+Parasound
MSM13/1031-1	03.12.09	12:40	35° 23.59' N	30° 11.89' E		Multibeam+Parasound
MSM13/1032-1	03.12.09	16:47	35° 20.1820' N	30° 14.1910' E	2028,5	Heat Flow
MSM13/1033-1	03.12.09	18:57	35° 19.8931' N	30° 15.7780' E	2033	Heat Flow
MSM13/1033-2	03.12.09	19:48	35° 19.8789' N	30° 15.6120' E	2043,5	Heat Flow
MSM13/1033-3	03.12.09	20:32	35° 19.8640' N	30° 15.4200' E	2039,5	Heat Flow
MSM13/1033-4	03.12.09	21:09	35° 19.8560' N	30° 15.2530' E	2045	Heat Flow
MSM13/1033-5	03.12.09	22:04	35° 19.8340' N	30° 15.0471' E	2045,2	Heat Flow
MSM13/1033-6	03.12.09	22:55	35° 19.81' N	30° 14.87' E	1974,4	Heat Flow
MSM13/1033-7	03.12.09	23:27	35° 19.8350' N	30° 15.0461' E	2089,3	Heat Flow
MSM13/1033-8	04.12.09	1:14	35° 19.6279' N	30° 15.7210' E	2042	Heat Flow
MSM13/1033-9	04.12.09	2:29	35° 19.3939' N	30° 15.8991' E	2062,6	Heat Flow
MSM13/1033-10	04.12.09	3:49	35° 18.9820' N	30° 15.9760' E	2139,5	Heat Flow
MSM13/1034-1	04.12.09	6:43	35° 20.06' N	30° 16.12' E	2026,5	TV Multicorer
MSM13/1035-1	04.12.09	8:59	35° 20.08' N	30° 16.12' E	2025,6	TV Multicorer
MSM13/1036-1	04.12.09	12:43	35° 20.0540' N	30° 16.1640' E		Elevator
MSM13/1037-1	04.12.09	13:15	35° 20.03' N	30° 16.11' E		ROV
MSM13/1038-1	04.12.09	20:23	35° 23.5090' N	30° 12.8710' E	1778,5	Heat Flow
MSM13/1038-2	04.12.09	21:10	35° 23.4549' N	30° 12.6880' E	1773,6	Heat Flow
MSM13/1038-3	04.12.09	22:11	35° 23.5969' N	30° 12.9481' E	1764,7	Heat Flow
MSM13/1039-1	04.12.09	23:22	35° 24.10' N	30° 12.00' E	1737	Multibeam+Parasound
MSM13/1039-2	05.12.09	1:17	35° 20.59' N	30° 15.02' E	2014,9	Parasound
MSM13/1039-3	05.12.09	7:05	35° 20.10' N	30° 14.98' E	2026,8	Parasound
MSM13/1036-1	05.12.09	9:55	35° 20.05' N	30° 16.23' E	1991	Elevator
MSM13/1040-1	05.12.09	14:12	35° 23.63' N	30° 13.17' E	1854,6	TV Multicorer
MSM13/1041-1	05.12.09	17:50	35° 23.25' N	30° 12.61' E	1797,9	TV Multicorer
MSM13/1042-1	05.12.09	20:17	35° 20.11' N	30° 16.24' E	2029,5	ROV
MSM13/1043-1	05.12.09	23:09	35° 23.59' N	30° 12.95' E	1805,4	Gravity corer
MSM13/1044-1	06.12.09	0:14	35° 23.5990' N	30° 12.9520' E	1788,7	Gravity corer
MSM13/1045-1	06.12.09	1:50	35° 28.29' N	30° 15.61' E	1326,9	Multibeam+Parasound
MSM13/1046-1	06.12.09	7:30	35° 25.71' N	30° 33.50' E	1729,9	Parasound
MSM13/1047-1	06.12.09	8:47	35° 26.34' N	30° 33.02' E	1731,7	Parasound
MSM13/1048-1	09.12.09	9:55	32° 32.0360' N	30° 21.1730' E	1695,2	Elevator
MSM13/1049-1	09.12.09	12:44	32° 32.05' N	30° 21.13' E	1703,5	ROV
MSM13/1050-1	10.12.09	0:41	32° 31.99' N	30° 21.12' E	1698,2	TV Multicorer
MSM13/1051-1	10.12.09	2:56	32° 31.99' N	30° 21.12' E	1693,8	TV Multicorer
MSM13/1052-1	10.12.09	4:00	32° 33.08' N	30° 20.27' E	1734,9	Parasound
MSM13/1053-1	10.12.09	9:22	32° 29.99' N	30° 14.71' E		AUV
MSM13/1054-1	10.12.09	17:52	32° 32.04' N	30° 21.17' E		ROV
MSM13/1055-1	11.12.09	2:22	32° 29.79' N	30° 16.66' E	1642	Parasound
MSM13/1056-1	11.12.09	9:41	32° 31.98' N	30° 21.15' E	1667,9	TV Multicorer
MSM13/1057-1	11.12.09	12:31	32° 31.98' N	30° 21.14' E	1667,3	TV Multicorer
MSM13/1057-2	11.12.09	14:15	32° 31.98' N	30° 21.15' E	1666,4	TV Multicorer
MSM13/1057-3	11.12.09	16:18	32° 31.97' N	30° 21.14' E		TV Multicorer
MSM13/1058-1	11.12.09	18:37	32° 32.07' N	30° 21.39' E		TV Multicorer

MSM13/1059-1	11.12.09	20:43	32° 32.05' N	30° 21.13' E		TV Multicorer
MSM13/1059-2	11.12.09	22:32	32° 32.05' N	30° 21.13' E	1694,2	TV Multicorer
MSM13/1060-1	12.12.09	3:54	32° 31.91' N	30° 18.69' E	1719	TV Multicorer
MSM13/1061-1	12.12.09	9:11	32° 31.98' N	30° 21.13' E	1667,2	TV Multicorer
MSM13/1062-1	12.12.09	12:02	32° 28.36' N	30° 12.57' E	1656,2	Parasound
MSM13/1063-1	12.12.09	15:50	32° 26.36' N	30° 12.56' E	1615,2	Multibeam+Parasound
MSM13/1064-1	12.12.09	18:39	32° 32.07' N	30° 21.39' E	1695,9	TV Multicorer
MSM13/1063-1	12.12.09	23:27	32° 32.34' N	30° 20.40' E	1714,1	Multibeam+Parasound
MSM13/1048-1	13.12.09	11:49	32° 32.25' N	30° 21.70' E	1703,5	Elevator